

COMPARATIVE STUDY OF EFFICACY OF CORTICOSTEROID VERSUS ANALOGUES PLATELET RICH PLASMA INJECTION IN THE MANAGEMENT OF CHRONIC PLANTAR FASCIITIS IN MAHARASHTRA POPULATION

Solunke Swaroop¹, Shevate Ishan², Chaudhari Tushar¹

¹Assistant Professor, Department of Orthopaedic, Dr. D.Y. Patil Medical College, Pimpri Pune, Maharashtra, India

²Associate Professor, Department of Orthopaedic, Dr. D.Y. Patil Medical College, Pimpri Pune, Maharashtra, India

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Corresponding Author:
Dr. Tushar Chaudhari,
Email: orthotushar@gmail.com

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Abstract

Background: Chronic plantar fasciitis is a common cause of heel pain and results in the degenerative process of plantar fascia at its calcaneal attachment. **Materials and Methods:** Out of 70 patients (seventy), 35 patients were injected with corticosteroid (2 ml, 8 mg) along with 0.5 ml of plain 2% xylocaine using a 20G wide-bore needle. PRP is prepared by drawing blood from the cubital vein with the help of BD vacutainer eclipse in three BD vacutainer tubes, which are 2.7 ml tubes that contain 0.35 ml of 3.2% sodium citrate as an anticoagulant. Blood was centrifuged twice, first at 1200 rpm and then at 2400 rpm. The platelets were checked randomly by a pathologist using Neubauer's chamber method or an auto analyzer. PRP was injected at the tenderness site, after injecting 2% xylocaine with a 20 Gauge needle and following up for a week, 6th week, 3rd month, and 6th month. **Result:** Clinical manifestations were VAS Baseline score – 7.135 in PRP group, 7.212 in the steroid group. The baseline of AOFAS was 55 (SD±5.10) in the PRP group, 56.36 (SD±3.22) in the steroid group. The t test was 1.33, and the p value was highly significant (p<0.001). AOFAS at 6th weeks, 3rd month, and 6th month had highly significant p values (p<0.001). **Conclusion:** In present pragmatic study it is concluded cortico-steroid is more effective for shorter period but PRP is more effective for long term relief.

INTRODUCTION

Chronic plantar fasciitis is the most common cause of foot complaints in adults.^[1] The conditions that cause plantar fasciitis are degenerative changes that occur in the tissue at the site of origin of the plantar fascia at the medial tuberosity of the calcaneus bone.^[2] In acute cases, plantar fasciitis is characterised by inflammation. In chronic conditions, the histology of tissue is enfeathered with macrophages, lymphocytes, and plasma cells, resulting in tissue destruction and repair involving immature vascularization and fibrosis. The normal fascia is replaced by angiofibroblastic hyperplastic tissue, which spreads itself throughout the surrounding tissue, creating a self perpetuating cycle of degeneration.^[3,4] There are many methods for treating plantar fasciitis, including rest, non-steroidal anti-inflammatory medication, and extra compared shock wave therapy steroid injectables, which are popular methods for treating such conditions but only seem to be useful in the short

term and only to a small degree; moreover, analogous platelet-rich plasma injections are used in the management of chronic plantar fasciitis. Hence, an attempt was made to compare the efficacy and duration of treatment in both medications.

MATERIALS AND METHODS

70 (seventy) patients aged between 25 and 60 years visited an orthopaedic Department of Dr. Dy Patil Medical College, Pimpri, Pune, Maharashtra, 411018, were studied.

Inclusive Criteria: The patients diagnosed with plantar fasciitis by clinical and radiological evaluation presenting a complaint of plantar heel pain for more than 6 weeks (>6 weeks) and plantar fascia thickness > 4 mm at the area of maximum tenderness (USG of heel for plantar fascia) were selected for study.

Exclusion criteria: Patients with severe anaemia and thrombocytopenia, immune compromised patients, and non-cooperative patients were excluded from the study.

Method: Out of 70 patients, 35 were given corticosteroids (2 ml, 8 mg) and 35 were given PRP. Depomedrol injection along with 0.5 ml of plain 2% xylocaine using 20 G wide bore needles into the point of maximum tenderness. Post injection, patients were asked to rest for 15 minutes and then allowed to walk.

PRP preparation and administration – For the preparation of PRP, blood was withdrawn from the cubital vein with the help of a BD vacutainer eclipse in three BD vacutainer tubes, each 2.7 ml and containing 0.5 ml of 3.2% sodium citrate, an anticoagulant, and a volume of approximately 2.35 ml for whole blood. It was prepared using a 2 – spin technique, in the 1st low spin step, blood is centrifuged at 1200 rpm for 10 minutes in a routine 380 R centrifuge model (Hettich, Zentrifugen). After the formation of three layers (a bottom layer of RBC, an upper layer composed of plasma, platelets, and some WBS, and an intermediate layer, or Buffy coat, composed mostly of WBC). The upper layer just above the Buffy coat was collected with a 10 ml syringe; this collection was performed carefully to avoid disturbing the bottom layer of RBC and the Buffy coat layer. Depending on the centrifugal force of the spin, the collected volume ranged from 0.75 ml to 1.25 ml in each BD vacutainer. Approximately 1 ml of the upper layer of the sample that underwent the first spin step was collected and transformed into one empty tube (approximately 3 ml). The tube was centrifuged again for 10 minutes at 2400 rpm. The upper half of the plasma volume, platelet poor plasma (PPP), was removed. The remaining volume of PRP was used for injection. The platelet count was estimated by the pathologist. The PRP was randomly checked for the number of platelets by Neubauer's chamber or auto analyzer. Most of the sample had a platelet count greater than 1,000,000/l in a 5 ml volume, which is five times the baseline. After this, the PRP is shaken by just turning the tube 2 to 3 times to mix the platelets.

PRP injection technique – patients were asked to resume supine positions, and the involved foot was cleaned and prepared with spirit and povidone iodine. The site of maximum tenderness, i.e., the medial aspect of the foot at the origin of the plantar fascia, was marked using a marker. One ml of 2% plain xylocaine was infiltrated into the skin and subcutaneous tissue. Dry needling, also called peppering, was used to locally "injure" the soft tissue to stimulate the inflammatory response. The concomitant delivery of the PRP then modulates (enhances) the healing response. Each masking point of tenderness is penetrated with a 20 G-gauge needle until the underlying periosteum is touched. A gristly, crunchy texture is audibly and palpably noted as the needle is advanced. After contacting the

periosteum, the needle was gently partially withdrawn and then advanced in a fan-like wheel (peppering) the area 7 to 10 times. Next, 1 ml of the PRP is injected as this peppering manoeuvre is continued. This process is then carried out at each marked site.

Post-injection care – post injection, patients were asked to rest for 15 minutes and then allowed to walk. As PRP effectively induces an inflammatory response, some patients experienced minimal to moderate discomfort following the injection, which usually lasts for up to a week. They are instructed to ice the injected area if needed for pain control and modify activity as tolerated. Acetaminophen was the optional analgesic, and NSAIDS were avoided. After 48 hours, patients were given a standardised stretching protocol to follow for two weeks. Patients were advised to avoid strenuous activities and rest for two weeks. No aggressive running or jumping activities were allowed for 2 weeks. After 4 weeks of the procedure, patients were allowed to proceed with normal sporting or recreational activities as tolerated. Any type of foot orthosis was not advised. Each patient was assessed functionally using American orthopaedic foot and ankle scores (AOFAS), visual analogue scale (VAS) scores, and radiologically by ultrasound thickness of the plantar fascia. The AOFAS and VAS scores were recorded before treatment and at follow-up visits scheduled at 6 weeks, 3rd months, and 6 months.

The duration of the study was from April 2022 to May 2023.

Statistical Analysis

Clinical manifestations comparison, VAS, AOFAS, and pain severity were studied by using the t test and percentage. The statistical analysis was done in SPSS software. The ratio of males and females was 2:1.

RESULTS

[Table 1] Clinical manifestations of patients with chronic plantar fasciitis Right heel – 20 (57.1%) PRP group, 21 (60%) corticosteroid group,

- Left heel –14 (40%) PRP group, 15 (42.3%) corticosteroid group
- VAS Baseline score - 7.156 in PRP group, 7.235 in corticosteroid group,
- Baseline AOFAS score 54 (± 5.10) in PRP group, 55.5 (± 3.28) in corticosteroid group.
- Thickness of Fascia - 5.74 in PRP group, 5.62 in corticosteroid group.

[Table 2] Comparative study of VAS in both group score –

- Pre-treatment–PRP group 7.135 in PRP group, 7.212 in corticosteroid group.
- At 6th Weeks 2.60 in PRP group, 1.92 in corticosteroid group.
- At 3rd months 1.92 in PRP group, 2.85 in corticosteroid group.

- At 6th months 1.40 in PRP, 3.77 in corticosteroid group.
- [Table 3] Comparison of pain sensitivity in both groups
- 6 (17.1%) in PRP group in No pain VAS=0 at 6th months
 - Mild pain VAS (1,2,3) – 16 (45.7%) in steroid group, 29 (87.8%) in PRP group at 6th week, 29 (82.8%) in steroid group, 13 (37%) in PRP group at 3rd month, 23 (66.7%) in PRP group, 7 (20%) in steroid group at 6th month
 - Moderate pain (VAS 4, 5, 6) – 12 (34.2%) in steroid, 7 (20%) in PRP group, pre treated, 9 (54.2%) in steroid group, 6 (17.6%) in PRP group, at 6rd week, 6 (17.6%), in steroid group, 22 (62.5%) in PRP group at 3rd month, 5 (14.2%) PRP group, 27 (77.1%) in steroid group.
 - Severe pain – (VAS 7, 8, 9) 22 (62.8%) in steroid group, 27 (77.1%) in PRP group in pre-treatment.

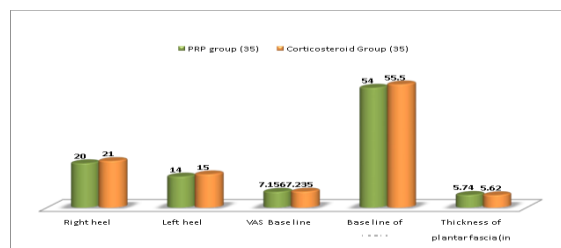


Figure 1: Clinical Manifestations of patients with chronic plantar fasciitis

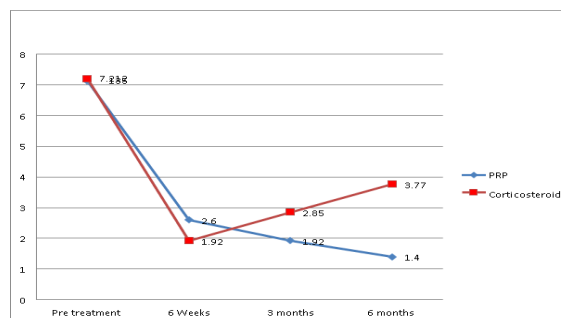


Figure 2: Comparison of VAS (Visual Analogue score) in both groups

[Table 4] Comparison of AOFAS score in both groups–

- Pre-treatment 55 (±5.10) in PRP group, 56.36 (±3.22) in corticosteroid group, t test 1.33 and p>0.19 (p value was insignificant).
- At 6th week 79.2 (±2.38) in PRP group, 86.5 (±1.32) in corticosteroid group, t test 15.8 and p<0.001
- At 3rd month 85.58 (±2.15) in PRP group, 79.46 (1.86%) in corticosteroid group, t test value 12.8 and p<0.001
- At 6th months 87.06 (±3.12) in PRP group, 73.65 (±3.28) in corticosteroid group, t test 17.5 and p<0.001

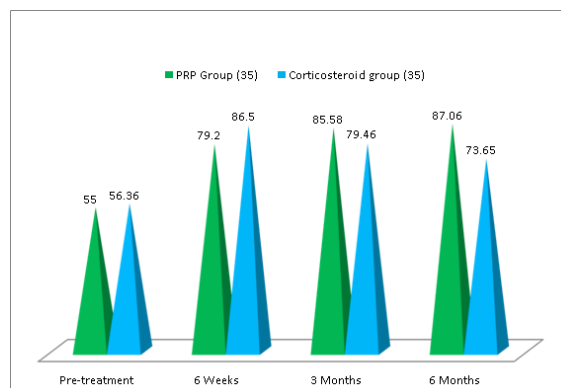


Figure 3: Comparison of AOFAS score in both groups

Table 1: Clinical Manifestations of patients with chronic plantar fasciitis. (No. of patients: 70)

Sl No	Manifestations	PRP group (35)	Corticosteroid Group (35)
1	Right heel	20 (57.1%)	21 (60%)
2	Left heel	14 (40%)	15 (42.8%)
3	VAS Base line score	7.156	7.235
4	Base line of AOFAS	54 (±5.10)	55.5 (±3.28)
5	Thickness of plantar fascia (in mm)	5.74	5.62

AOFAS = American orthopaedic Foot and ankle score, PRP = Platelet rich plasma, VAS = visual analogue scale

Table 2: Comparison of VAS (Visual Analogue score) in both groups

Visual score	PRP group (35)	Corticosteroid Group (35)
Pre treatment	7.135	7.212
6 Weeks	2.60	1.92
3 months	1.92	2.85
6 months	1.40	3.77

Table 3: Comparison of pain severity in both groups

VAS	Pre treatment		6 th week		3 rd month		6 th month	
	Steroid (%)	PRP (%)	Steroid (%)	PRP (%)	Steroid (%)	PRP (%)	PRP	Steroid
No pain VAS-0	0	0	0	0	0	0	6 (17.1%)	0
Mild pain VAS 1, 2, 3	0	0	16(45.7%)	29(82.8%)	24(82.8%)	13 (37.1%)	23 (65.7%)	7 (20%)
Moderate pain VAS 4, 5 6	10 (34.2%)	7 (20%)	19 (54.2%)	6 (17.6%)	6 (17.6%)	22 (62.8%)	5 (14.2%)	27 (20%)
Severe pain VAS- 7 8,9	22 (62.8%)	27 (77.6%)	0	0	0	0	0	0

Worst pain VAS – 10	0	0	0	0	0	0	0	0
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PRP = Platelet Rich Plasma, VAS = Visual Analogue Scale

Table 4: Comparison of AOFAS score in both groups

AOFAS score	PRP Group (35)	Corticosteroid group (35)	t test	p value
Pre-treatment	55 (SD±5.10)	56.36 (SD±3.22)	1.33	p>0.19
6 Weeks	79.2(SD±2.38)	86.5 (SD±1.32)	15.8	P<0.001
3 Months	85.58 (SD±2.13)	79.46 (SD±1.86)	12.8	P<0.001
6 Months	87.06 (SD±3.12)	73.65 (SD±3.28)	17.5	P<0.001

AOFAS = American Orthopaedic Foot and Ankle Society Score PRP = Platelets Rich Plasma

DISCUSSION

A comparative study of the efficacy of corticosteroids versus analogues Platelet-rich plasma injection in the management of chronic plantar fasciitis in the Maharashtra population In clinical manifestations, the right heel was 20 (57.1%) and was treated with 21 (60%) corticosteroids. For the left heel, 14 (40%) were treated with PRP, and 15 (42.8%) were treated with the corticosteroid group. VAS Baseline score of 7.15 in the PRP group and 7.23 in the corticosteroid group, baseline of AOFAS 54 (±5.10) in the PRP group and 55.5 (±3.28) in the corticosteroid group. Thickness of the plantar fascia [Table 1] In comparison to the VAS analogue in both groups – In pre-treatment,

7.135 in the PRP group and 7.212 in the corticosteroid group in the 6th week, 2.60 in the PRP group and 1.92 in the corticosteroid group; in the 3rd month, 1.92 in the PRP group and 2.82 in the corticosteroid group. In the 6th month, 1.40 in PRP, 3.77 in the corticosteroid group [Table 2]. Comparison of AOFAS scores in both groups: In pre-treatment, 55 (± 5.10) in the PRP group and 56.36 (±3.22) in the corticosteroid group the t test was 1.33 and p>0.19. At 6 weeks, 79.2 (±2.38) in the PRP group, 86.5 (±3.22) in the corticosteroid group, t test of 15.8, and the p value was highly significant (p<0.001), At 3rd month, 85.58 (±2.13) in the PRP group, 79.46 (±1.86) in the corticosteroid group had a t test of 12.8 and a p value of highly significant (p<0.001). In 6th month, 87.06 (±3.12) in the PRP group, 73.65 (±3.28) in corticosteroid group, t test 17.5 and p value were highly significant (p<0.001) (Table- 4). These findings are more or less in agreement with previous studies.^[5-7]

Plantar fasciitis is considered an overuse injury and such patient's history will typically reveal some combination of either intrinsic or extrinsic factors that contribute to the development of the injury. Extrinsic factors are due to unyielding surface on exercise (movement) and improper and excessively worn foot wear.^[8] Intrinsic factors include obesity, foot structure, reduced plantar flexion strength and reduced flexibility of the plantar flexor muscles and tentional mal-alignment of the lower extremity.^[9] The most often cause of plantar fasciitis is excessive pronation (inversion) of foot. Increased tension placed arch lowering during standing and walking.

The non-surgical management for the treatment of the symptoms and discomfort associated with plantar fasciitis are (1) reducing pain and inflammation (2) reducing stress to tolerate level (3) restoring muscle strength and flexibility involved tissue. Corticosteroid local injection gives sudden relief for pain and inflammation but to reducing stress, to tolerate and restoring muscle strength PRP proved to be efficient because enables cell proliferation, angiogenesis and cell migration are stimulated resulting in tissue regeneration. Platelets secrete anti-microbial peptides, suggesting an antibiotic effect.^[10] Moreover PRP has anti-inflammatory and analgesic effects also. It is also reported that PRP is superior to hyaluronic acid, visco supplementation because PRP is a biological product.^[11] Hence PRP HAS a multi potential application in orthopaedics & sport medicine. While corticosteroid has many side effects on prolong usage like osteoporosis, loss of immunity even addiction to steroids is also recorded.

Limitation of study

Owing to the tertiary location of the research centre, the small number of patients, and the lack of the latest techniques, we have limited findings and research.

CONCLUSION

In the present comparative study of PRP and corticosteroids in the management of chronic fasciitis, it was confirmed that PRP injection is an efficient and safe therapeutic option for the treatment of chronic plantar fasciitis, but long-term treatment has to be the protocol to get satisfactory results. But this study demands further histopathological, nutritional, genetic, and musculoskeletal studies. Because, despite many contributing factors, none of these factors have proven to be predictive of clinical outcome, plantar fasciitis occurs at any age in both sexes and in many occupations.

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